Cement MILL SECTION of

Concrete

Vol. 23 DECEMBER, 1923 No. 6

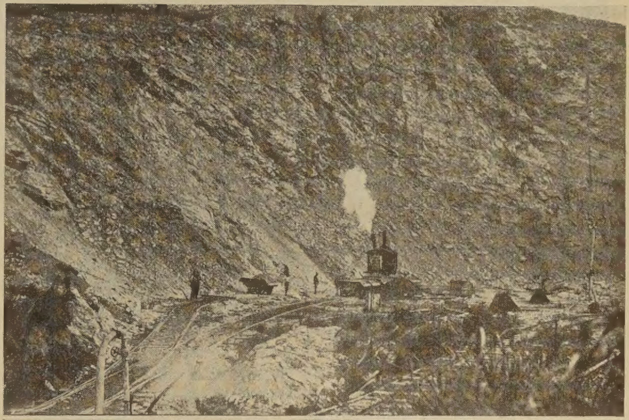
Wilsons New Zealand Cement Works at Portland

The portland cement industry has reached large proportions in the North Auckland peninsula, and the Wilsons New Zealand Portland Cement Co., the present output of which is approximately 75,000 tons annually, is planning extensions which will greatly increase cement production. The works, which are the largest of the kind in the Southern hemisphere, are thoroughly up to date and compare favorably with anything of the kind in the world.

The main plant is situated at Portland, a few miles from Whangarei, where the company has 2000 acres of land containing large deposits of limestone rock. The area of the proved workable limestone formation is about 750 acres in extent, and it has been estimated that there is sufficient limestone on this property to supply the cement requirements of the Dominion for 1000 years, if the rock were mined from above sea level only. Investigations, however, have disclosed the fact that the rock extends at least 200 feet below the level of the sea.

The company was originated in 1885, but the works at Portland were built by American engineers and taken over in 1918. The property was then a barren-looking wilderness with perhaps a dozen cottages dotted about. At the present time, Portland is regarded as a workers' modern colony, containing more than 80 comfortable villas mostly built of concrete. Electric lights have been installed throughout, and a water system is being inaugurated, the supply being taken from Otaika from the Whangarei borough mains.

The population of Portland has reached something over 600, half of this number being engaged at the company's works. A public school has a roll of 115 pupils and a teaching staff of three. There are modern stores, a post office, boarding house, bachelors' barracks and a large hall, in which pictures are shown twice a



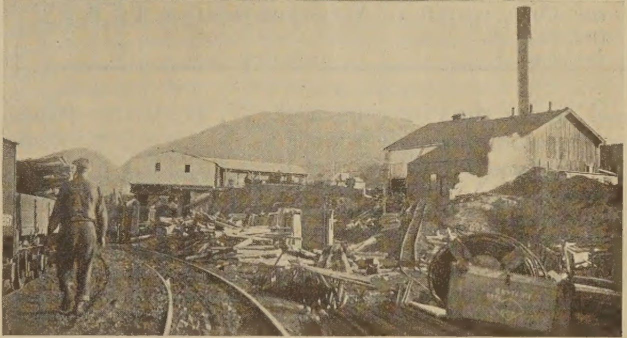


Fig. 2—Cement Rock Quarry 200 ft. Face at Portland
Fig. 3—Wilsons Colliery 17 Miles from the Cement Plant

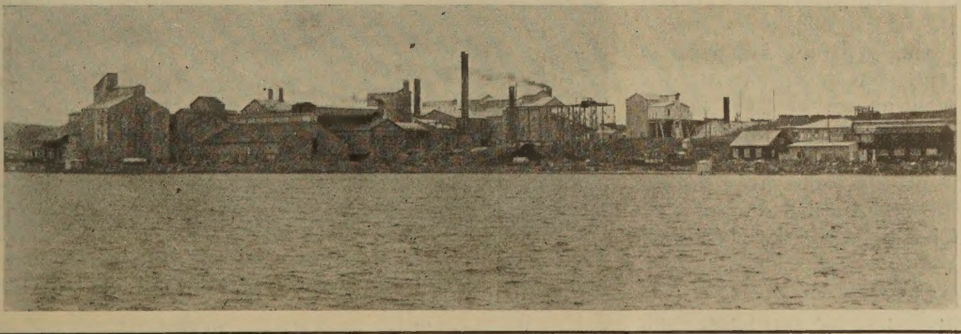


Fig. 1—General View of The Wilsons Cement Plant from the Wharf

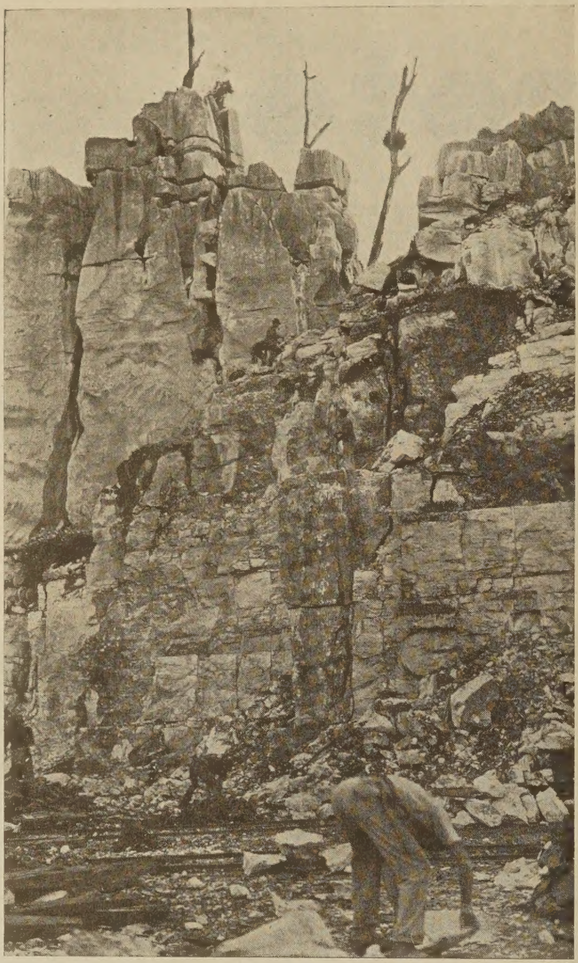


Fig. 4—Wilsons White Limestone Quarry 17 Miles from the Plant and Worked from the Same Railway Siding as the Coal. The Limestone Overlies the Coal, which is Approximately 300 Ft. Below the Surface

week under the direction of the Y. M. C. A. There are three buildings given over to the use of the single men of the town. In two of these buildings provision is made for 48 men, 24 in each, while 8 men are housed in the third. These buildings are provided with electric lights, hot and cold water showers, and concrete tubs for washing clothes.

A billiard room containing two tables is very much in use after work is ended for the day, and a seven-acre tract of land has recently been set aside for a recreation reserve.

In addition to the property at Portland, the company owns Limestone Island, where the original works were established.

Although not in use at the present time, Limestone Island is still regarded as a valuable asset by the company. The company's works at Warkworth are in full swing at the present time.

The company also owns the Wilsons collieries at Hikurangi, from which all the coal requirements for the plant are drawn, as well as an electric power station at the Wairua Falls, and its own steamships.

The value of the plant is estimated at approximately £500,000. The works at the present time are running at full capacity (75,000 tons per annum), and of this amount 1000 tons are consumed weekly by the local market.

The Quarry

In the quarry, in the direction of Oakleigh, the largest blast ever set off in New Zealand quarrying operations was fired earlier in the year. The rock dislodged by the blast was estimated at approximately 100,000 tons.

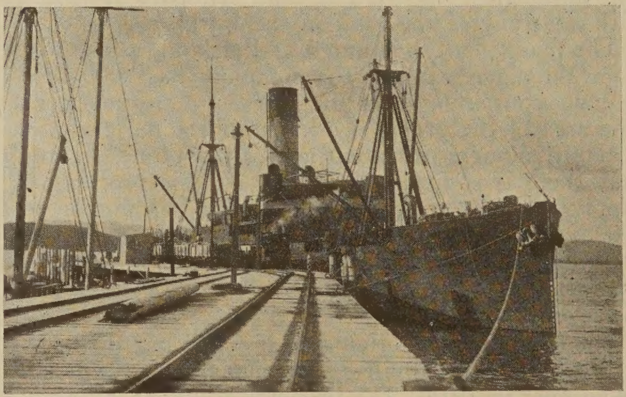
The principal raw materials used are the rock from the main quarry and white lime from the company's works at Waro Rocks, Hikurangi. From 40 to 60 tons of white or agricultural lime are received daily, and this material constitutes approximately 12% of the raw material used in the manufacturing of the cement.

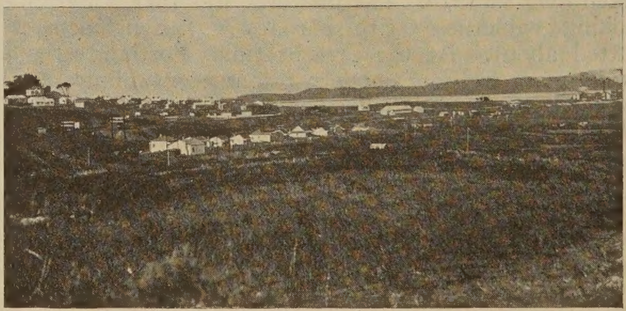
Blast holes on the upper level of the main quarry are drilled with Gilbert drills. The rock is transported from the quarry in 5-ton cars, which discharge into a bin feeding the main crusher.

Steam navvies work on the upper and lower levels in the quarry loading cars with rock, each shovel having a capacity of 2 cu. yds.

The plant is a dry process plant. All of the most recent mechanical methods are employed, 450 tons of raw material being required to produce 230 tons of cement daily.

The primary crusher is a No. 6½ gyratory, furnished by the Fuller Engineering Co., Fullerton, Pa. After the first crushing, the rock is conveyed by a 30-in. belt convator 150 ft. long to the secondary crushers. The secondary crushers are 30 in. x 18 in. Fuller rolls and Jeffry hammer mill, made by the Jeffry Mfg. Co., Columbus, O., the latter being used on white lime rock. Here an electrically driven crane, furnished by Messrs. Whitaker of England, hoists the proper quantity of





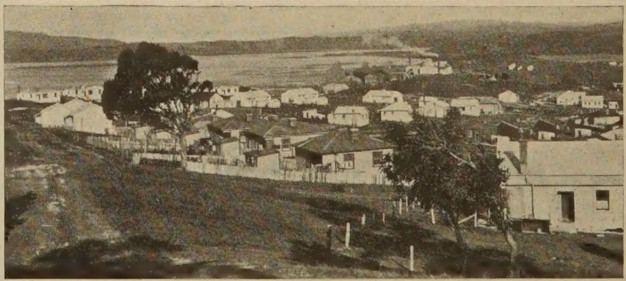


Fig. 6—Loading Cement at the Company's Wharf, Portland

Fig. 7—Portland Town with Whangarei Harbor and Headland in the Distance

Fig. 8—Portland Town with Cement Plant in the Background

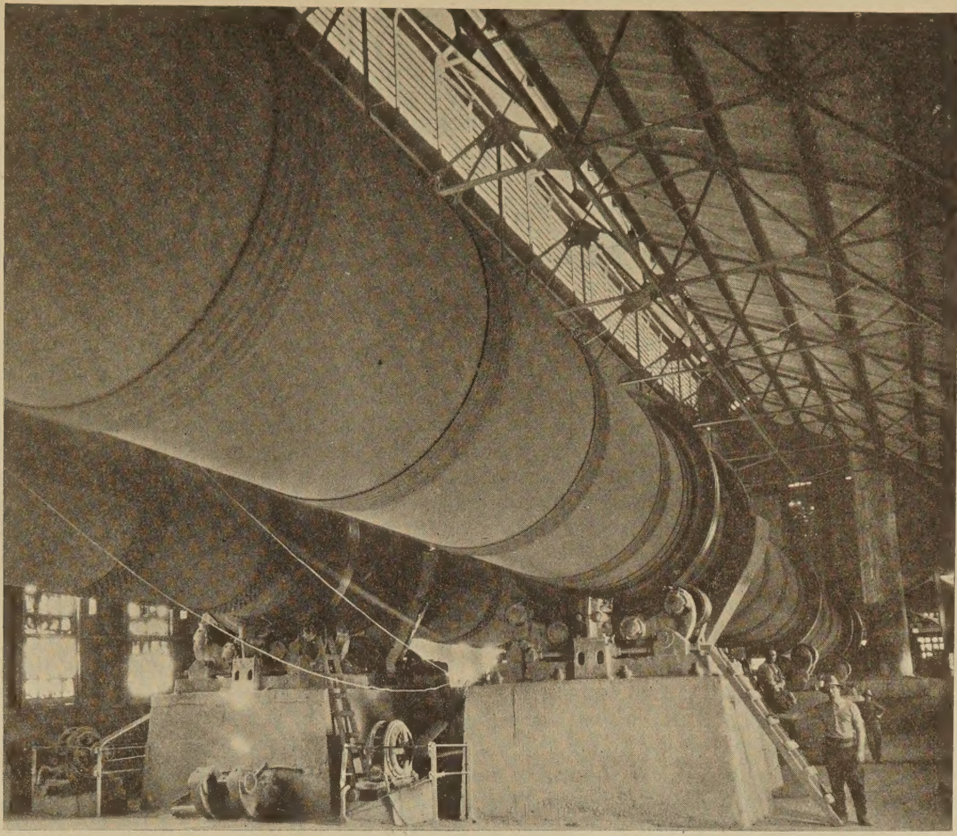
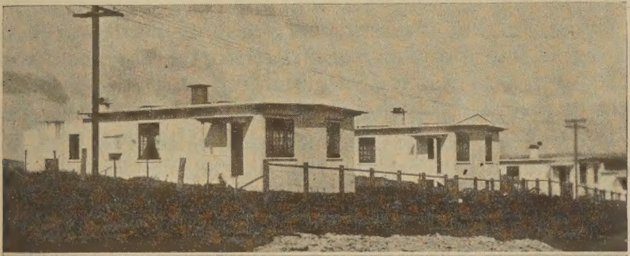
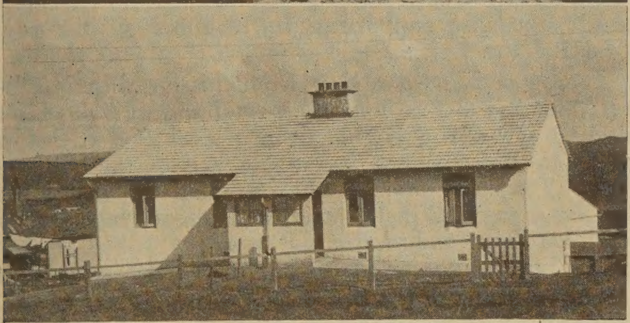


Fig. 5—Rotary Kilns, 8 ft. 6 in. x 160 ft.

limestone to be added to the hydraulic lime rock. In the secondary crusher, the stone is ground to the size of marbles.





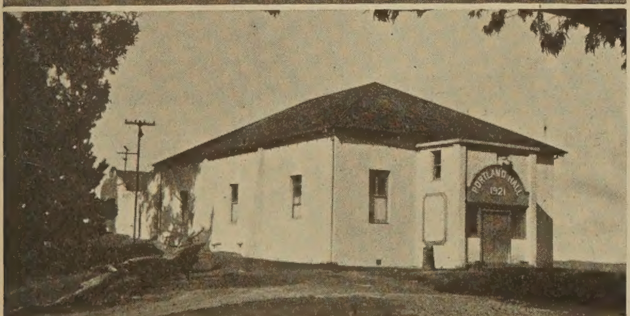


Fig. 9—Concrete Dwellings, 5 Rooms Each
Fig. 10—Two 4-room Cottages in Concrete, Tile Roof, Semi-detached
Fig. 11—Portland Hall

After passing through the rotary dryers, the raw material is conveyed to the fine grinding equipment, consisting of 42-in. Fuller mills, and then fed to the kilns. The two rotary kilns, 8 ft. 6 in. in diameter and 160 ft. long, were supplied by the Vulcan Iron Works, Wilkes-Barre, Pa.

COAL

Coal for the kiln fuel comes from the company's mine at Hikurangi, arriving at the rate of from 90 to 100 tons per day. This is discharged into a second bin in the locality of the rock storage, and is dried and pulverized in 42-in. Fuller mills.

About 3% of gypsum is added to the clinker to regulate the setting properties of the cement, the required gypsum being obtained from South Australia. The finish grinding is done with 57-in. Fuller mills and one 7-ft. x 24-ft. Allis-Chalmers compeb mill.

The cement stock house has a capacity of 6,000 tons. The finished product is packed in the packing department with Bates valve baggers at a rate up to 500 bags per hour. Slings are used for hoisting the bags of finished cement into the ship's hold, in the event of its being loaded into vessels at the end of the wharf, which extends nearly a mile out to deep water. As much as 2,750 tons of cement have been loaded from this wharf in one shipment.

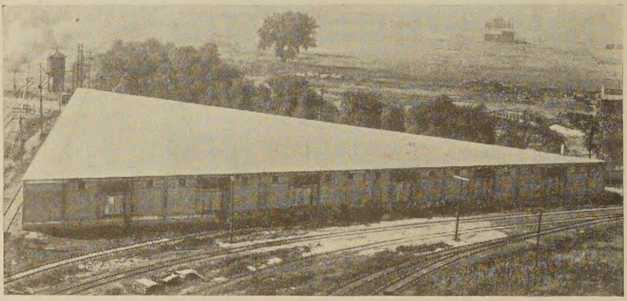
The electric energy is conducted from the power house at Wairua Falls, 17 miles distant, and the current transformed from 22,400 volts to 400 volts for distribution at Whangarei and Kamo. This current is used to operate the equipment in the plant.

A site has been selected where preparatory work is under way for the establishment of a larger mill. The new mill will have approximately three times the capacity of the present works. T. H. Wilson is works manager.

Marquette Company Completes Cement Storage Warehouses

The Marquette Cement Mfg. Co.'s cement storage warehouse and transfer docks at Davenport, Ia., designed for the exclusive storage and transfer of cement in bags, is triangular in shape and covers a ground area of approximately 66,000 sq. ft. This is one of the largest and best type buildings of its class and no expense has been spared in an endeavor to obtain this result. It has a storage capacity of approximately 750,000 sacks.

An underlying limestone ledge at an average elevation of 3 ft. below ground level covers the entire property and furnishes the most excellent foundation upon which the structure is built. The floor is elevated 4 ft. above established street and track levels or a height approximately 8 ft. above original property grade.



The Marquette Company's Davenport Warehouse

The floor construction is of the two-way, flat-slab type and is designed to sustain a uniform live load of 800 lbs. per sq. ft. The typical floor panels are 15 ft. x 16 ft. 6 in., the latter dimension being the distance center to center of supporting columns placed parallel to the building line; an arrangement which gives uniform column spacing on all exterior walls. In general the typical panels are placed at right angles to each of the three sides of the building, the irregular bays occur only at lines of their intersection and comprise but approximately 15% of the total required number of panels. By this arrangement the cost of concrete forms was reduced to a minimum.

When the rather unusual ground conditions and shape of the structure are considered, the flat-slab type of floor construction adopted fulfills all requirements in a most economical and satisfactory manner. All column footings rest directly upon the underlying rock ledge. Structural steel columns, girders and purlines support the roof. The roof is of 2-in. x 6-in. dressed and matched lumber. The roof surface, approximately 67,000 sq. ft. is covered with Barrett built-up composition roofing.

The exterior steel columns, encased in concrete, form the wall pilasters. Lintel and belt courses are of concrete cast in place. Wall panels are of granite faced cement block. The exterior walls are reinforced by horizontal bars spaced approximately every two block courses in height. Bars are placed at center of wall and the ends securely anchored to wall columns; this is good practice where the possibility of shifting the stored material is to be guarded against.

For under-floor ventilation screened openings with controlling louvres were placed in all exterior walls for allowing of the free circulation of air.

Shipping facilities are provided by switch tracks along two sides of the building. Shipping doors at car level permit of the simultaneous loading and unloading of fourteen cars. On the remaining side of the building six enclosed docks open directly from a paved highway and provide ample facility for local truck or team delivery.

The building was designed and its construction carried out under the supervision of Neiler, Rich & Co., Engineers, and J. J. Davey, architect, Chicago, Ill. The Priester Construction Co., Davenport, Ia., was the general contractor.

CHICAGO WAREHOUSE HAS UNIQUE FEATURES

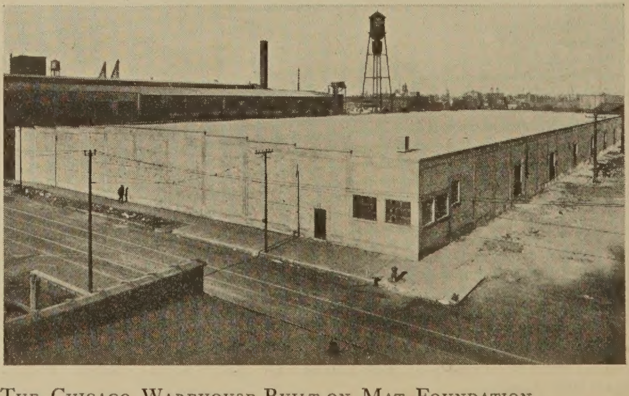
The new storage warehouse of the Marquette Cement Mfg. Co., a one-story building, 178 ft. x 353 ft., located on the corner of Elston Ave. and Redfield St., Chicago, has a storage capacity of approximately 750,000 sacks of cement.

This building presents certain unusual features of design. The problem submitted to the engineers was the design of a one-story building with the floor at the usual car body height above grade and rail; the floor to sustain a live load of 800 lbs. per sq. ft.

In line with the usual scheme of design and the requirements of the Chicago Building Code, this floor would have been supported on piers extending with their foundations from a level of at least 4 ft. below grade and also supporting the columns of the roof construction.

It was decided to deviate from this usual design for reasons of proper economy. A retaining wall was built around the site extending from a level of 5 ft. below grade to the floor line—its outside face on the building line. The area so inclosed was filled in with clean cinders, deposited in 12-in. layers and each layer rolled with a 10-ton steam roller.

A 12-in. reinforced slab forming the floor, was laid



The Chicago Warehouse Built on Mat Foundation directly on this fill and tied into the reinforced concrete retaining wall. The skeleton supporting the roof—columns, girders and beams was set and anchor-bolted onto this floor slab. The roof is of 3-in. x 6-in. dressed and matched lumber. The roof covering is Barrett built-up composition roofing. The exterior columns were incased in concrete forming concrete pilasters. The spandrel beams at the roof level were incased in concrete forming a concrete parapet wall.

The rectangles between floor slab, parapet wall and pilasters were filled in with screen walls, composed of hollow concrete blocks 16 in. long, 8 in. high and 12 in. thick. The only openings are the loading doors. The lighting is artificial. All this to furnish the greatest protection against moisture.

This design showed a saving of about $45,000 over the usual design. Competition figures on both designs were obtained from a number of leading Chicago contractors. The adopted design was approved by the Chicago Building Department after being satisfied regarding the merits of the construction.

The building was designed and its construction supervised by the firm, L. E. Ritter, Consulting Civil Engineer.

Pacific Company Builds New Gypsum Mill

By W. C. Stevenson

The Pacific Portland Cement Co., Consolidated, has been operating for a number of years a gypsum plaster mill at Mound House, Nev. As an increased output became necessary, it was decided to build a new and additional mill at Gerlach, Nev. Gerlach, Nev., is on the Western Pacific Railroad Company's main line, 439 miles from San Francisco.

Most industrial plants in the West are served by hydro-electric power, but there being no hydro-electric power within range of Gerlach, it became necessary to install a power generating station to serve the plant and town.

The deposit of gypsum is located ten miles southerly from the railroad town of Gerlach. It lies in the foothills at the base of a granite mountain range, and itself stands in mountain form, rising above the surrounding country. The deposit is remarkably pure and clean. The prospecting has been quite thorough and consisted of diamond drill holes, open test pits, tunnels, etc., all of which showed a uniform high purity and lack of waste. Gypsum in rock form comes to the surface of the ground and in no place has waste been encountered, and likewise there will be no stripping required.

The Quarry

This gypsum deposit is one that can and will be operated using a power shovel, which is a Marion, Model 32 revolving electric shovel.

The quarried material will be loaded into 15 cubic yard, standard gauge, rigid body steel cars, which will be drawn by a 9-ton gasoline locomotive to the car dumper. A rotary car dumper operated by compressed air will completely revolve the cars to an upside down position so they will dump onto a grizzley feeder 10 ft. long, regulating the feed to a No. 6 Jumbo Williams mill[2]. The Williams mill will reduce the product to a ¾-in. size and under, at the rate of 100 tons per hour, and discharge the crushed material onto a 24-in. inclined belt conveyor. This conveyor will discharge into a 20-ft. diameter concrete silo bin holding 300 tons of crushed material, and which will act as the loading for the aerial tramway. The tram loading bin will be provided with 3 air-operated gates for loading 17-cu. ft. tram buckets. The aerial tramway is 5 miles long, has a total drop of 850 ft. from the loading end to the discharge end. Due to the ruggedness of the country, the maximum span from tower to tower is slightly over 2,000 ft. Using 1⅜-in. lock coil cable on the carrying side of the tramway, there will be a carrying capacity of 100 tons per hour. The tramway is driven by one 15 h. p. motor located at the lower terminal.

The discharge terminal of the tramway at the mill will be made of structural steel. No bin has been provided at this terminal and the buckets will discharge directly onto an open-air pile, having a maximum height of 35 ft. A tunnel, with a belt conveyor underneath this discharge pile, will deliver the material into the mill bins.

Due to winter weather conditions, the quarry and tramway will operate nine months during the year and deliver enough material at the mill to operate it for twelve months. The mill storage will be made and reclaimed by means of a revolving crane derrick, having a 100-ft. radius. This derrick is equipped with a 1½-yd. clam shell bucket and is so arranged that it can get material from the pile made under the tram discharge terminal and distribute this material completely around the mast with a maximum radius of 100 ft. and a maximum height of 30 ft. In reclaiming the storage for mill use, the same crane derrick will discharge its load into the pile under the tram discharge terminal.

The mill has been located at a point midway between the quarry and the Western Pacific R. R. yards. As described above, the raw material is brought to the mill over rough country by means of an aerial tramway. The finished product from the mill, loaded in railroad cars for shipment, will be delivered to Gerlach, Nev., on rails. This railroad to where it joins the Western Pacific rails is approximately five miles long, mostly down hill with the loads. It will be operated by means of a 19-ton gasoline locomotive. The locomotive itself will be equipped with automatic air for train service. At the mill there will be two tracks alongside the packing department, so arranged that switching can be done without interfering in any way

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[1] Marion Steam Shovel Co., Marion, Ohio

[2] Williams Patent Crusher & Pulverizer Co., St. Louis, Mo.

with the operation of the packing department, and there is provided track space for 20 empty cars and 20 loaded cars at the same time. The spotting of the cars for the packing department will be done by means of an air operated drum hoist.

Another railroad track runs between the raw grinding department and the calcining department, separating these two buildings. This track is for the purpose of loading land plaster and raw gypsum for cement mills, the raw gypsum to be taken directly from bins which are so installed that they can feed either directly into open gondola cars or into the raw grinding mills. This track is provided with a 100-ton track scale for weighing the material, and is likewise provided with tail track room for spotting empties.

The entire layout of the mill has been made with a view toward ease and economy, and for continuous operation; consequently, large bins are installed between each of the several operations. All mill bins are of the circular type with conical bottoms and made of structural steel and plates. All bins and the stock house for storing finished material will be provided with compressed air agitation in order to keep the material flowing when desired.

Safety Measures Provided

The entire layout has been made with a view toward safety for employes. All moving parts are entirely protected and stairs, platforms, etc., provided with hand rails, toe guards, and such. No ladders are allowed and ample space provided around all parts for ease in inspection and repair.

All machinery units are individually driven by electric motors and in most cases direct connected, using spur gear reducers wherever possible. All screw conveyors, elevator bins, and such, are made as nearly dust tight as possible in order that working conditions will be agreeable and a minimum expense for clean up and waste.

All of the mill buildings are structural steel covered with galvanized corrugated steel and provided with concrete floors. The sack repair and packing departments are in one building, paralleling the railroad track, which building is provided with a second floor, also made of concrete. Material will be lifted from the first to the second floor by means of an electric driven hydraulic elevator.

Raw Grinding Department

The raw grinding department will contain six 5-roller Raymond mills[3], each individually driven. The fans for these mills will be direct connected to their motor. Ground gypsum for calcining or for land plaster is produced by the Raymond mills.

Six 10-ft. diameter by 10-ft. high kettles, made by the J. B. Ehrsam & Sons Mfg. Co., will constitute the calcining department. Each of these kettles is provided with four 18-in. flues, placed two above two. Driving gear mechanism for the kettles has been placed high above the kettle tops so that the operator will have plenty of height for walking around on top of the kettles without stooping. The burning will be done using boiler fuel oil heated to 180° F. and atomized with air at two pounds pressure.

The hot pits are of the usual design and large enough to hold two kettle dumps without raking. From the hot pits to the stock house and to the packing department a double conveying system has been installed so that two different kinds of material can be handled simultaneously through the kettles and to any point beyond.

Packing

The packing will be done on three 3-tube Bates plaster packers[4], so spaced that different cars can be loaded simultaneously, either with the same material or with different kinds of material. These packers are placed close to the front wall of the building and the sacked material will be trucked directly into the railroad cars.

Returning, the empty sacks will be unloaded from the cars on the tail track of the stock house, cleaned, sorted, repaired and stored on the same floor level as the packing department so that when needed they will have to be trucked only a few feet into the next room. All fiber, hair, retarder and such, will be elevated to and stored on the second floor so that it will be close to the place of using.

The stock house consists of 8 concrete silo bins, each containing 400 tons of finished plaster. The conveying system is so arranged that material from the kettles can be discharged into the stock house or into the packing department bins as desired.

All motors through the plant are 440 volt, 3 phase, 60 cycle, and manufactured by the Westinghouse Electric and Manufacturing Co. The power line carrying 11 KV. current from the mill to the quarry supplies the current for the quarry shovel and crusher.

The power to operate these various units will be generated by three 800 h. p. Price-Rathburn oil engines[5], each engine direct connected to a 675 KVA General Electric generator[6], generating current at 480 volts. Due to the high temperature in the summer time, generators have been provided with temperature coils. As water is scarce, it will be necessary to practice the greatest of economy in water waste. The circulating water for the engines will be cooled by means of a Redwood water tower[7] being supplied by the C. F. Braun Co. As the water loss in a cooling tower is more or less proportional to the water passing over the tower, the engine piping has been so arranged that only one-half of the circulating water will pass over the tower, the balance being returned directly into the circulating pump suction. Enough drop in temperature of that part of the water passing over the tower will be obtained to give the necessary cooling effect in the engines.

A concrete reservoir holding 200,000 gallons of water will serve as the mill and town supply.

As the location is on the desert some distance from any habitation, it has been found necessary to build and operate an entire town for the employes. This town will consist of twenty cottages, hotel, club house, hospital, and office building, and such. Each of these cottages will be plastered inside and provided with lights, bath and water, and a concrete cellar. The hotel will be provided with steam heat.

The office, power house and lubricating oil house will all be solid monolithic concrete, fireproof structures. The office will be equipped with steel shelving for mill supplies, and for commissary supplies, and will also be provided with a concrete vault for records.

In addition to casting, dental and wall plasters, the company will manufacture plaster blocks, wall board, Keenes cement, etc.

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[3] Raymond Bros. Impact Pulverizer Co., Chicago, Ill.

[4] Bates Valve Bag Co., Chicago, Ill.

[5] Rathburn-Jones Engineering Co., Toledo, Ohio.

[6] General Electric Co., Schenectady, N. Y.

[7] C. F. Braun Co., Alhambra, Calif.

Gypsum In 1922

By K. W. Cottrell

Abstracted from *Mineral Resources of the United States*, 1922, United States Geological Survey.

PRODUCTION

The quantity of gypsum mined in the United States in 1922 was 3,779,949 short tons, an increase over the output in 1921 of 31%.

Of the total quantity sold crude 13% was sold as agricultural gypsum and the remainder for use in portland cement and paint and for other purposes. The quantities of agricultural gypsum sold in Kansas, Michigan, and New York were 94, 51, and 32%, respectively, less than in 1921; the quantities sold in Iowa, Nevada, and Ohio were 71, 93, and 38% greater than in 1921. The total sales of agricultural gypsum were 3% less than in 1921. The total quantity of gypsum sold crude to portland cement factories in 1922 was 24% more than in 1921. Only one state, Oklahoma, reported decreased sales, 42%. Sales in other states increased—in Michigan 14%, Kansas 16%, Nevada and Ohio 22% each, Iowa 38%, New York 44%, Texas 66%, and Wyoming over 300%.

Sales of Keenes cement increased 52% in quantity and 40% in value over those in 1921. The average value per ton dropped from $16.11 to $14.75.

Plaster board, tile, and blocks were made in 16 states at plants operated by the original producers of the gypsum used in their manufacture. Plants of firms that make these products but do not mine gypsum are not included here, the gypsum they use being already accounted for as plaster sold by the original manufacturers. The figures given for boards and blocks therefore do not include the entire production of these articles in the United States. Wall board increased 62% in quantity and 45% in value. The average value per ton decreased from $41.76 to $37.32. Blocks and tile increased 71% in quantity and 25% in value. The average value decreased from $16.65 to $12.20.

GYPSUM PRODCUED AND SOLD IN THE UNITED STATES, 1918-1922

Year	Crude mined (short tons).	Value of crude and calcined sold
1918	2,057,015	$11,470,854
1919	2,420,163	15,727,907
1920	3,129,142	24,533,065
1921	2,890,784	23,700,290
1922	3,779,949	29,361,151

GYPSUM PRODUCED AND SOLD IN THE UNITED STATES IN 1922, BY USES

	Short tons	Value
Calcined:		
Stucco	396,990	$2,813,561
Neat plaster	1,333,261	12,126,811
Sanded plaster	80,455	1,165,771
Mixed plaster	[a]218,650	[a]1,914,572
Plxster of Paris, molding, casting plaster, etc.	[b]126,288	[b]1,198,819
Keenes cement	21,991	324,316
Plaster board	42,088	945,171
Wall board	120,591	4,500,725
Partition tile	68,338	915,449
Roof tile	(c)	(c)
Special tile or blocks	44,834	368,068
Other purposes [d]	37,779	644,542
	2,491,265	26,917,805
Crude	770,725	2,443,346
		29,361,151

[a] Includes small quantity of wood fiber plaster.
[b] Includes dental plaster and plaster sold to plate glass works.
[c] Included under "Other purposes."
[d] Includes roof tile and material used for pointing up wall boards.

KEENES CEMENT PRODUCED AND SOLD IN THE UNITED STATES, 1918-1922

Year	Manufacturers	Short tons	Value
1918	5	12,823	$151,802
1919	6	15,395	200,360
1920	6	16,542	246,433
1921	7	14,430	232,457
1922	6	21,991	324,316

GYPSUM PRODUCED AND SOLD IN CANADA, 1918-1922.

Year	Short tons	Value
1918	152,287	$ 823,006
1919	299,063	1,215,287
1920	429,144	1,893,991
1921	386,550	1,785,538
1922	441,159	2,043,145

[a] Report on mineral production of Canada, Canada Dept. Mines.

IMPORTS AND EXPORTS

Five companies reported to the Geological Survey that they imported gypsum in 1922. These were the Connecticut Adamant Plaster Co., Higginson Manufacturing Co., J. B. King & Co., Rock Plaster Corporation, and Charles W. Priddy & Co. The quantity of gypsum reported by these five companies was less than that reported by the Bureau of Foreign and Domestic Commerce. Of the gypsum imported about 19,000 tons was sold crude. Of this quantity 84% was sold for use in agriculture and the remainder to paint mills and the textile trade and as terra alba. More than 250,000 tons were sold calcined and were used principally in the manufacture of gypsum plasters. It is estimated that the total value of the gypsum and products sold by these five firms in 1922 was more than $2,000,000, in comparison with a business of more than $29,000,000 done by the entire industry.

GYPSUM IMPORTED AND ENTERED FOR CONSUMPTION IN THE UNITED STATES, 1918-1922

Year	Unground		Ground or calcined		Manufactured plaster of Paris	Keenes cement		Total value
	Short tons	Value	Short tons	Value		Short tons	Value	
1918	50,653	$55,004	6,117	$70,028	$1,765	111	$2,259	$129,056
1919	171,733	211,946	10,415	126,405	7,719	187	5,984	352,054
1920	282,486	397,942	14,921	179,191	10,282	202	5,338	592,753
1921	266,796	364,318	4,495	55,109	33,072	184	6,836	459,335
1922	409,475	523,939	1,774	32,651	55,116	403	9,636	621,342

GYPSUM, CRUDE, GROUND OR CALCINED, IMPORTED INTO THE UNITED STATES IN 1922, BY COUNTRIES[a]

(GENERAL IMPORTS)

Country	Short tons	Value
Canada	405,912	$539,996
Belgium		10
France	102	966
Germany	192	2,316
Italy		8
England	4,725	9,076
Hongkong	6	144
	410,937	552,516

[a] Imports after Sept. 21, under new tariff act, included only crude gypsum.

Cement and Lime Burned in Electric Furnace

A new patent has been granted in Sweden to T. A. F. Holmgren for a process for the manufacture of cement, burned lime, etc., in an electric furnace. The raw materials are crushed into suitable grain sizes, mixed and fed into an electric furnace. The heat is produced in one or more zones by alternating current, which is applied through one or more circuits with phase-differences like 360° divided by the number of circuits. Gas is drawn or forced through the furnace in opposite direction to that followed by the material.

Portland Cement Production Sets New Record In October

Production of portland cement in October was the largest for any month this year, and incidentally broke all records for a single month. Report of the United States Geological Survey just issued, places the total production for the month at 13,350,000 bbls., compared with 13,100,000 in September and less than 12,300,000 a year ago. For the ten months ending October 31, over 114,000,000 bbls. were produced, exceeding last year's record output for the same period by 20,000,000 bbls. or 22%.

Shipments from the mills in October were 14,285,000 bbls., an increase of about 11% over October, 1922. Shipments for the ten months were close to 119,000,000 bbls., or more than was shipped during the entire banner year 1922.

Stocks of cement in manufacturers' hands at the end of October were about 4,600,000 bbls, or 450,000 bbls. more than a year ago. Consideration of the fact that stocks of cement at the beginning of the year were very much lower than at the beginning of 1922, and the ten months' shipments have been 17,000,000 bbls. greater than last year, serves to indicate how successfully the industry has coped with the increased demand. The greatly increased efficiency of the transportation systems has helped materially in making this record possible, and recent increases in productive capacity have given the industry a substantially greater output.

The statistics shown in the following table, issued by the Department of the Interior and prepared under the direction of Ernest F. Burchard of the Geological Survey, are based mainly on reports of producers of portland cement, but in part on estimates. The estimates for October, 1923, were made necessary by the lack of returns from three plants.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN OCTOBER, 1922 AND 1923, AND STOCKS IN SEPTEMBER, 1923, IN BARRELS

Commercial District	Production		Shipments		Stocks at end of October		Stocks at end of Sept. 1923(*a*)
	October		October				
	1922	1923	1922	1923	1922(*a*)	1923	
Eastern Pa., N.J. & Md. . .	3,340,000	3,342,000	3,403,000	3,922,000	1,091,000	1,055,000	1,635,000
New York	642,000	731,000	769,000	864,000	263,000	380,000	513,000
Ohio, Western Pa. & W. Va.	1,315,000	1,266,000	1,423,000	1,412,000	308,00	159,000	304,000
Mich.	687,000	925,000	685,000	980,000	157,000	177,000	232,000
Ill., Ind. & Ky. . . .	1,860,000	1,933,000	2,143,000	2,056,000	354,000	272,000	395,000
Va., Tenn. Ala. & Ga	590,000	838,000	607,000	844,000	275,000	272,000	279,000
Eastern Mo., Ia., & Minn.	1,255,000	1,452,000	1,250,000	1,448,000	333,000	625,000	622,000
Western Mo. Neb. Kan. & Okla. . . .	924,000	979,000	907,000	935,000	630,000	697,000	652,000
Texas. . . .	330,000	332,000	321,000	326,000	161,000	227,000	221,000
Colo. & Utah. . . .	208,000	217,000	237,000	206,000	149,000	174,000	163,000
Calif.	806,000	1,049,000	819,000	1,021,000	196,000	283,000	256,000
Ore., Wash. & Mont.	330,000	286,000	290,000	271,000	232,00	0 276,000	261,000
	12,287,000	13,350,000	12,854,000	14,285,000	4,149,000	4,597,000	5,533,000

(*a*) Revised.

Stocks of clinker, or unground cement, at the mills at the end of October, 1923, amounted to about 3,007,000 bbls., compared with 3,379,000 bbls. (revised) at the beginning of the month.

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in September, 1923, amounted to 215,785 bbls., valued at $379,906. The total imports in 1922 amounted to 323,823 bbls., valued at $628,846. The imports in September were from Sweden, 57,513 bbls.; Denmark, 49,583 bbls.; Belgium, 35,846 bbls.; Canada: Quebec and Ontario Provinces, 30,514 bbls., British Columbia and Yukon, 2,937 bbls.; Maritime Provinces, 30 bbls.; Norway, 29,579 bbls.; other countries, 9,783 bbls. The imports were received in the following districts: Los Angeles, 99,442 bbls.; Porto Rico, 23,317 bbls.; Hawaii, 22,930 bbls.; Buffalo, 12,284 bbls.; Florida, 10,163 bbls.; Vermont, 9,323 bbls.; St. Lawrence, 8,906 bbls.; New York, 7,811 bbls.; New Orleans, 6,917 bbls.; San Francisco, 6,041 bbls.; South Carolina, 4,546 bbls.; other districts, 4,105 bbls.

The exports of hydraulic cement in September, 1923, were 77,121 bbls., valued at $216,564, of which was sent to Cuba, 25,928 bbls.; to the other West Indies, 13,645 bbls.; Central America, 14,162 bbls.; South America, 12,535 bbls.; Mexico, 7,574 bbls.; Canada, 1,082 bbls.; and to other countries, 2,195 bbls.

The statistics of imports and exports of hydraulic cement in October, 1923, are not available.

Lime Production Heavy in Eastern Canada

BY W. J. MCNULTY

The Stetson, Cutler Co. of St. John, N. B., which operates lime manufacturing plants at St. John and elsewhere in the province of New Brunswick, has manufactured more lime this season than any previous season. The kilns are in full operation and will be continued as producers until early in the winter. The company is composed largely of United States capital and was recently reorganized with added capital, the scope of operations being somewhat widened. The original firm was Stetson and Cutler of Boston.

The Brookville Lime Co., operating lime manufacturing plants at Brookville, N. B., has also broken its previous records for lime production.

Indications are that shipment of lime will continue heavy from eastern Canada to United States ports by water all through the winter. In the past, most of the lime produced in eastern Canada was exported to the United States by rail, but owing to the heavy transportation charges by rail, schooners are now being chiefly utilized as carriers. More lime has been shipped out of Canadian ports to United States ports this year than ever before. This is attributed to the building boom in different states and is particularly true of the New England states. While a part of the Canadian lime is shipped to Europe, the bulk of the production is sold in the United States owing to the more favorable prices.

Donald Fraser of Plaster Rock, N. B., vice president of Fraser Companies, of Plaster Rock, Edmundston and Fredericton, has a hobby and it is that of identifying himself conspicuously in the prohibition cause. Previous to the enactment of the prohibitory laws, Mr. Fraser advocated and fought strenuously for prohibition statutes. Since then he has been addressing audiences all over eastern Canada in support of retention of the dry laws in the provinces. He is president of the chief prohibitionist organization.

British Trade in Cement

By Alfred Nutting
Clerk in the American Consulate-General, London, England

During the first six months of 1923, the import and export trade of the United Kingdom has shown considerable expansion compared with the corresponding period in either 1921 or 1922.

Imports rose this year to 71,249 tons, an increase of 18% over 1922 and of nearly 50%, contrasted with 1921, and at the same time the average import price has fallen from £5:0s:7d per ton two years ago, to £3:11s:4d last year, and further to £2:14s:7d per ton in the current period.

The monthly average of imports for the first six months of 1922 was 10,440 tons, and for 1923, 11,875 tons; the following were the aggregate imports, month by month, during the period in the last two years:

Imports

	1922 Tons	1923 Tons
January	6,577	11,471
February	5,122	13,062
March	12,988	10,620
April	11,332	12,121
May	11,645	12,088
June	12,600	11,887
	60,264	71,249
Value	£215,048	£194,380

British Exports

Compared with the first six months of 1921, exports of cement in the current period show an increase of 54%, and of 52% over 1922. The fall in average export price has been even more marked than was the case with imports, declining from £6:5s:9d per ton in the 1921 period, to £3:12s:7d a year ago, and to £2:14s:1d per ton this year, the last named quotation being lower than the import price; in June 1923, the average export rate declined further to £2:12s:9d. per ton.

Aggregate exports in the period in 1921 totaled 168,070 tons; in 1922, 171,258 tons; and this year, 259,968 tons. The monthly average (for six months) last year amounted to 28,543 tons and to 43,328 tons in the current period. Statements are appended showing the quantities exported month by month in 1922 and 1923, and destinations of the six months' aggregates. It will be seen that 36% was shipped to British East Indies last year, and 25% in 1923, while 44% was destined for unenumerated "other" countries in the current period against 39% a year ago.

Exports By Months

	1922 Tons	1923 Tons
January	23,409	43,152
February	36,096	36,105
March	22,543	32,373
April	27,172	46,562
May	29,358	44,147
June	32,680	57,629
	171,258	259,968
Value	£621,441	£702,645

Exports Six Months By Destinations

	1922 Quantity Tons	1922 Value	1923 Quantity Tons	1923 Value
Netherlands	3,308	£ 7,870	26,292	£ 42,203
France	68	881	83	241
Brazil	10,280	36,361	20,155	57,469
Argentina	177	612	2,647	7,332
British South Africa	8,581	27,847	15,741	38,056
British East Indies	62,667	241,788	67,027	194,457
Australia	18,658	60,061	12,016	33,640
New Zealand	355	2,221	1,273	4,029
Other countries	67,163	243,800	114,734	325,218
	171,258	£621,441	259,968	702,645

Dehydrating Gypsum By Steam Under Pressure

In the dehydration or calcination of gypsum, it has been a common practice first to break up the rock gypsum and then heat the fragments by means of an open fire, so as to drive out the moisture. This process is wasteful and expensive. It necessitates the employment of skilled help to examine the material at intervals to see that the required degree of heat is at all times applied and to prevent burning, which would result in imperfect calcination. Also by such heating process, small particles of gypsum are carried off by the escaping steam. It has been found that this results in a loss of substantially 20%. F. B. Stuart and C. A. Rivers, of El Paso, Texas, have demonstrated not only that gypsum can be dehydrated by steam, but that a better and cheaper product thus is possible.

In carrying out the process, U. S. Pat. No. 1,463,913, the rock gypsum is loaded into steel cars which are run into cylinders of 6-ft. diam. After bolting on the cylinder heads, steam is admitted to 150 lbs. pressure, where it is maintained for about 4 hrs., depending largely on the physical structure of the gypsum. At the expiration of this period the steam is shut off, and after the pressure within the cylinder has been considerably reduced, the balance of the steam is blown off. Upon the removal of the car from the cylinder, it will be found that the gypsum has been uniformly dehydrated. It is now ready to be crushed and pulverized. The material in this form is commercially known as plaster of Paris, and is mixed with other substances in the manufacture of numerous forms of building material in which gypsum is a primary constituent.

By the steam process, a considerable saving in fuel may be realized over the old fire process. Further, it is only necessary to employ a single fireman to attend to the series of boilers, and all danger of the gypsum being over- or under-heated is precluded. By forcing out the water by means of steam pressure, is obviated loss of the gypsum incident in the use of the fire or heating process. There will, however, be a minimum loss in weight due only to the removal of the water. Steam dehydration enables the product to be more easily pulverized.—*Chemical Age.*

Bibliography of Magnesian Cements

A bibliography of magnesian cements, by G. H. West, R. L. Sebastian and W. A. Darrow, has just been issued by the Department of the Interior, through the Bureau of Mines. This bibliography was compiled in the course of research work by the Bureau of Mines on the utilization of the magnesites in the West. The results of the research will appear later as a bulletin of the bureau. The present bibliography cites 211 references relating to analytical methods; physical and chemical properties of magnesium and calcium compounds; calcinating operations and manufacturing of magnesium oxide or hydroxide; constitution of magnesium oxychloride cements; practical preparation of cements; tests and specifications, magnesite statistics, etc. Serial 2534, *Bibliography of Magnesium Cements*, may be obtained from the Department of the Interior, Bureau of Mines, Washington, D. C.

Waste Heat from Kilns Operates Entire Mill

By H. A. Schaffer
Conservation Engineer, Portland Cement Association

Reprinted from *Chemical and Metallurgical Engineering*

The utilization of the heat in the gases escaping from rotary kilns to generate steam with which to operate the entire plant probably marks the greatest improvement in equipment of portland cement factories in recent years, for it is during the past 6 years that waste heat boilers have been installed on a large scale in these plants.

The application of the idea is by no means a new development. When the original portland cement plant in the Nazareth district (Pennsylvania) was designed in 1897, Dr. Irving A. Bachman conceived the idea of generating a portion of the steam required to operate the plant from the heat in the kiln gases which, up to that time, were allowed to escape through stacks into the atmosphere.

Dr. Bachman placed the boiler immediately over the rear kiln housing so that the dust laden gases entered the first pass in the boiler directly after leaving the kiln, with no intervening flue to collect even a portion of the dust. It was found impossible to keep the boiler clean under these conditions; furthermore, natural draft was the only means of drawing gases through the kiln and boiler and the dust accumulated so rapidly that continuous operation of the kiln was not possible. The result was that the original waste heat boiler was soon abandoned.

The late Prof. R. C. Carpenter, of Cornell University, was another pioneer who took a prominent part in the development of the waste heat boiler. Several years after Dr. Bachman's experiment, Professor Carpenter installed a waste heat boiler to receive the hot gases from one of the rotary kilns in the Cayuga plant at Portland Point, New York. Some very interesting tests were made on this boiler while the tubes and gas passages were clean and the results were published in the trade journals. At this place, however, ample flue connections were not provided for the removal of a large percentage of the dust between the upper end of the kiln and the boiler. The same general result obtained at Nazareth was experienced in the Cayuga plant, although the company struggled for a long period to handle the dust before finally abandoning the waste heat boiler.

It will therefore be seen that the early endeavors to utilize successfully the heat in the kiln exit-gases showed the necessity for precipitation and removing much of the dust before these gases entered the boiler.

Profiting by these early experiences, the next waste heat boiler in the cement industry was somewhat removed from the upper end of the kiln with a substantial flue constructed between the kilns and the boilers. Economizers were placed after the boilers and an induced draft fan after the economizers. Another feature of this installation was the provision for firing the boilers by hand when the kilns were not operating.

In comparison with present efficiencies this installaton did not show up very well, but when it is considered that the plant was designed in 1903 and is still operating and developing approximately one-half of the steam required to operate the entire plant, the results are quite creditable.

We also find that some of the earlier installations were designed and constructed without giving proper consideration to air leakage, this condition prevailing both at the kiln openings and boiler settings. Little or no importance was attached to the infiltration of cold air at the upper or rear end of the kiln.

Regulation and control of draft, another important factor in obtaining maximum efficiency in kiln and waste heat equipment, were also partially neglected, which is another reason the early waste heat boilers in the cement industry failed to show the results of performance attained with present-day equipment.

The modern waste heat boilers are closely connected to the kilns. Air seals are placed on the upper end of the kiln shell to exclude the cold air at this point. All clean-out doors on dust chambers, flues, and at the bottom of each pass in the boilers are tight fitting and in many places are protected with a plastic clay mixture at the joints which is renewed each time the dust is removed. Great care is also used in the construction of the boiler settings, to make them air-tight.

CHANGES IN DESIGN BENEFICIAL

Probably the higher percentage of rating developed and over-all efficiency of the boilers installed during the past 6 years over the older equipment are due principally to changes in the design of the boilers utilizing waste gases from cement kilns. Further study and experimentation showed that the rate at which heat is transferred from low-temperature kiln gases to the metal surface of boiler tubes increases as the velocity of the gas increases. Furthermore, if this velocity were increased three times, the heating surface could be reduced one half. It was, therefore, found that instead of a boiler with more than 20 sq. ft. of heating surface for each boiler-horsepower generated, one with 10 sq. ft. of water heating surface would suffice. Lengthening of the gas passages was also found to increase the efficiency of boilers for this purpose. This is best accomplished by rearrangement of the baffle walls in the standard boilers.

One other reason for higher efficiency in the modern waste heat systems in cement plants is the scientific control which is exercised in the handling of the entire system. Analysis of the waste gases is made at regular intervals throughout the day. Hourly readings are recorded of the draft at various points throughout the system. Steam and water flowmeters show the amount of water used, and pyrometers and recording thermometers are also installed for the purpose of recording the gas, water and steam temperatures throughout the entire system.

SOME INSTALLATIONS PRODUCE 100% OF THE POWER REQUIRED

That intelligent regulation and control is a paying proposition from the front end of the kiln to the fan after the economizers, has been clearly demonstrated in many modern portland cement plants. Probably the one outstanding feature in the development of the waste heat boiler in the cement industry is the fact that quite a number of plants are now producing all of the power required to operate their entire plants in waste heat boilers. This condition prevails not alone in the dry process but during the past year has been shown possible in the wet process of manufacture.

It should be stated, however, that the ability to develop 100% of the power required to operate any cement plant depends largely on the character of the prime movers and to fairly low kilowatt-hours per barrel consumption in the various mill departments. Some of the older plants with old style reciprocating engines or high steam consuming turbines are obliged to operate some auxiliary boilers in addition to their waste heat equipment. There are, however, plants of later design with low steam consuming prime movers and a satisfactory consumption of power in the raw and clinker grinding departments, which are experiencing no trouble at all in generating 100% of their power requirements. It should be borne in mind, however, that in order to effect these savings, which amount to from 30 to 50 lbs. of coal per barrel of cement manufactured, large sums of money must be added to the already high investment. As an example, depending upon the size of the cement plant, the cost of the equipment of a modern waste heat plant will vary from $250,000 to $700,000. There are now thirty portland cement factories with waste heat boilers installed. Many other companies have plans under consideration which call for this improvement; undoubtedly the high cost of construction and equipment is causing delay on the part of some companies. However, they all recognize the importance of conserving the heat in the waste gases from their rotary kilns.

State to Consider Methods of Purchasing Cement

The Michigan State Administrative Board has appointed a committee for the consideration of methods of purchasing cement for the 1924 construction program of the State Highway Department. The committee consists of F. F. Rogers, state highway commissioner, Henry Croll, state budget director and F. D. Messenger, contract engineer for the State Highway Department.

This committee is to act in conjunction with the highway committee of the Administrative Board which is composed of the superintendent of public instruction, secretary of state and state treasurer.

For the past two years the Michigan State Highway Department has entered into contracts with several cement mills to furnish the necessary cement for state paving and bridge work, the 1923 contracts totaling approximately one and one-quarter million barrels. Although the 1924 construction program has not yet been definitely determined, it is anticipated by state officials that the requirements for next year will be between one and one-half million and two million barrels.

Different propositions are being considered before definite action is taken by the committee in making its final recommendations to the Administrative Board.

Missouri Arranges for Its Cement Requirements

The bids opened on September 28 last for furnishing cement for the State road purposes, in Jefferson City, Mo., by the Missouri State Highway Commission were all rejected. These bids were for furnishing the cement by various methods and for periods extending over 1, 3 and 5 years.

Bids were received at the same time from existing cement plants and proposals from interested parties for constructing cement plants both with and without state assistance in financing.

At the same time it was also stated that any other plans submitted for furnishing state requirements for cement would receive consideration. In accordance with this latter statement a proposition was submitted by William Volker, owner of the Great Western Portland Cement Co. to refund (personally) to the Commission the profit on the 290,000-barrel bid of the Great Western company. His offer to cover the company's market price bid is for the 5-year period and was accepted by the State Highway Commission.

It was also proposed to let the Commission audit the books in order that a determination of the profit satisfactory to both parties might be made and to name one director.

In view of this favorable proposal from the Great Western company, no action has been taken by the Commission for the leasing or construction of a cement plant in the state of Missouri.

Recent Freight Rate Rulings

Proposed reductions in freight rates on gypsum, plaster, stucco and gypsum and plaster products from Montana to destination in the same state and Washington, Oregon and Idaho have been disapproved by the Interstate Commerce Commission as prejudicial against plaster manufacturers at Tacoma and Seattle. The schedules were filed with the Commission to become effective July 23, and were suspended pending investigation until December 23. The railroads on November 22 were ordered to cancel the schedules on or before December 21.

The Three Forks Portland Cement Co., manufacturing plaster and cement at Hanover, and the Northwest Gypsum Products Co., a producer of gypsum rock and plaster at Gypsum, Montana, appeared in support of the reduced rates. The latter were protested against by the Pacific Coast Gypsum Co., manufacturing plaster at Tacoma, Wash., and the Western Wallboard Co., making plaster board and plaster blocks at Seattle. The Certain-Teed Products Co., which has a plaster mill at Gypsum, Ore., and the Pacific Portland Cement Co., which manufactures plaster at Mound House, Nev., also appeared in opposition to the proposed rates.

Freight rates on cement from the Kansas gas belt mills and Dewey, Okla., to Oklahoma points over interstate routes have been found preferential of competing mills at Ada, Okla., Bonner Springs, Kans., and Sugar Creek, Mo., in a tentative decision on complaint of the Iola Cement Mills Traffic Association submitted to the Interstate Commerce Commission by Examiner John T. Money. Rates removing the prejudice against the Kansas producers are recommended by the examiner. The rates from Ada to Kansas points are found preferential of the mills at Bonner Springs, and Examiner Money also recommended that this disparity should be corrected.

The Atlas Portland Cement Co. has filed complaint with the Interstate Commerce Commission against the Adirondack & St. Lawrence Railway and other roads, charging that freight rates on portland cement from its mill at Navarro (Northampton), Pa., to destinations in Pennsylvania, New York, Delaware, Maryland and the District of Columbia are unjust, unreasonable and discriminatory, because higher, both actually and relatively, than from Universal, Pa., to the same destinations. Establishment of reasonable rates to apply in future was requested.

Improvements in Shaft Cement Kilns

Many small improvements have been made in shaft kilns for Portland cement during the last eight years (1914-1922). These relate to various portions of the kiln rather than to any new principle.

Thus, the automatic filling of shaft kilns is ensured by the use of briquettes of cement-mix, these being delivered to the kiln at a uniform rate by means of a mechanical feed and distributed by an automatic scraper or rake which revolves around the top of the kiln. The fuel, in the form of coke breeze, is supplied in alternate layers with the briquettes. The details of the mechanical devices which control the supply of briquettes and fuel differ with each firm supplying them.

The automatic discharge of shalt kilns is effected by various devices, of which the most important are: (*a*) curved bars which, when partially rotated, form a sufficiently large opening to permit the clinker to pass between them; (*b*) a rotating base plate which discharges a definite quantity of clinker at each revolution; (*c*) a bucket conveyor which removes the clinker from below the kiln and so causes a further quantity to fall out of the kiln; and (*d*) various shovel-like devices which dig out the clinker automatically

The air supply, both for cooling and combustion. has been placed under much better control than in the older kilns. It may be divided into three parts: (*a*) air used to cool the clinker sufficiently to enable the latter to be handled conveniently—incidently the heat imparted to the air by the clinker facilitates the combustion of the fuel; (*b*) hot air admitted directly to the zone of combustion; and (*c*) hot air used to dry or pre-heat the cement mix. An investigation of the amount of heat evolved by the fuel, the amount of air required to cool the clinker, and the heat needed to dry and pre-heat the raw mix, will show that there is ample scope for full utilization of all these sources of air.

The use of fan draught instead of natural draught is also increasing, as it provides a far better control of the kiln and eliminates the variations due to climatic conditions.

Usually four or five kilns are connected to a main flue, from which the gases are exhausted by an induced fan of 40 H. P. but in some works each kiln has a separate fan. It is sometimes economical in power to use a separate fan for each kiln, as leakages in a long main are thereby minimized and if a kiln is out of use at any time no power is wasted. The draught can be regulated far better when each kiln has a separate fan.

The kinds of grates used in modern cement kilns vary from a simple grate to various complex auto-discharging grates. Sometimes the grates are vertical, with an automatic discharge below; in other kilns the grate is solely horizontal; and in still other kilns both horizontal and vertical grates are used. In a few cases an air-cone—similar to that used in some gas producers—is placed in the bottom of the kiln and the air is injected through this cone.

The methods used in preparing the raw mix and in forming the briquettes have not been improved in any striking manner during the past few years. The improvement made consists chiefly in a more thorough mixing and in the use of heat which would otherwise have been wasted. Usually, layers of coke and briquettes are used. In one type of kiln the free fuel is only burned in the outer zones; the material fed to the centre of the kiln consists of a mixture of raw meal and powdered fuel.—*Tonindustrie Zeitung*.

Twelve Hour Compressive Strength Tests

Some very interesting series of tests to determine the compressive strength of portland cement at twelve hours have been carried out by A. G. Fleming, chief chemist of the Canada Cement Co. Ltd. and James Coccioletto, assistant chemist of the same organization. These tests were inaugurated at the behest of a contractor in Montreal, who, for the first time in his experience was making use of the modern so-called moving form method of concrete construction.

According to *Municipal Improvements*, published by the Canada Cement Co., Ltd., this contractor believed he needed a quick setting portland cement, because the minimum time the concrete would be in the forms would be 12 hours, after which, it would have to bear the weight of the superimposed concrete which under the best possible conditions might be fully 12 ft. in thickness.

Previous experience of the cement company with quick setting cement in portland cement mortars and briquettes had gone to show that the normal slow setting cement would give a greater strength at 24 hours and later periods. As the strength at 12 hours was somewhat in doubt, the experimenters decided to find out by actual tests.

For the first test, a sample of cement which had been stored for four months in the cloth sack and which took its initial set in about four hours and its final set in six hours was used. Four sets of 2-in. x 4-in. cylinders were molded as follows:

1st. 1:3 Standard sand mortar.
2nd. 1:3 standard sand mortar with warm water temperature 106° F.
3rd. 1:3 Standard sand mortar plus 5% calcium chloride by weight of cement.
4th. 1:2 Standard sand mortar.

The results were so interesting that it was decided to proceed to make a greater variety of mixtures, using for one test the quickest setting cement in the laboratories and for the other tests, a sample of cement taken from the bagging machines the same day. The effect of 3% and 4% calcium chloride additions was tried getting the maximum strength with 3% calcium chloride per weight of cement used.

Later, a more comprehensive series of tests of the effect on strength immediate and permanent of calcium chloride in proportions of 1% to 4% of the weight of the cement, was started and these tests will be carried out to one year. One of the series is being carried out on ground clinker to which no gypsum was added. The ground clinker had an initial set of 30 min. Incidentally the compression tests to date on the clinker are not nearly as good as the results obtained with the cement.

The average 24-hour compressive strength of the ground clinker 1:3 mortar, was 233 lbs. and at the same age cylinders of cement averaged 1,073 lbs. Twelve hour tests have not been made on these samples of clinker and cement but at a later date when the test series is complete, the results obtained from them will be published by the company.

Effect of Hot Cement on Paper Bags

By W. Herzberg

Report from the State Testing Laboratories, Berlin-Dahlem, in *Paper*.

Cement is often shipped in paper bags. In the operation of filling the bags, when the cement plant is operating at full capacity and there is urgent need for haste in packing, it often happens that the cement has a temperature of from 60 to 80° C. when it enters the bag.

The result is that the moisture contained in the paper of which the bag is made is driven out for the most part. This action may last as long as 2 to 3 days according to the conditions that exist in practice.

This action of the hot cement—the fact that the action is drawn out for a comparatively long period of time—suggested an inquiry to determine what happens to the strength of the paper when it is subjected to the influence of hot cement.

A large number of different papers were used in making the experiments, and care was taken to see that every composition of paper was represented in the samples that were employed in the experiments. In this way it was hoped to obtain a clear idea as to what happens to the paper when it is subjected to such treatment.

Three different experiments with three different papers are reported below, as the first step in the investigation. The results are given in tabular form, as follows:

Paper No. 1	a	b	c	d	e
Moisture in paper %	9.2	1.4	9.0[1]	....	......
Tearing length (see note 2) meters	5525	6250	5425	5625	5775
Stretch in percentage	3.0	1.5	3.3	2.9	2.8
Number of foldings	827	10	1014	776	592
Paper No. 2					
Moisture in paper %	9.5	1.7	9.1[1]	......	......
Tearing length (see note 2) meters	5225	5600	5350	5250	5375
Stretch in percentage	2.6	1.5	3.2	2.7	2.5
Number of foldings	774	12	836	792	477
Paper No. 3					
Moisture in paper %	10.0	1.5	9.1[1]	......	......
Tearing length (see note 2) meters	4774	5550	5075	4775	5225
Stretch in percentage	3.0	1.9	3.2	2.8	2.5
Number of foldings	614	8	744	592	414

EXPLANATION OF TABLE

a. The figures in this represent the results that were obtained by testing the paper in the condition in which it was received from the manufacturers.

b. The paper was dried at a temperature of 80° C. for a period of 5 hours and then tested directly after being taken out of the drying oven.

c. The paper was subjected to a drying heat of 80° C. for a period of 5 hours and then was subjected to the action of air containing 65% humidity for a period of 5 hours, and then was subjected to the action of air containing 65% humidity for a period of 24 hours.

d. The paper was subjected to a drying heat of 80° C. for a period of 5 hours and then exposed to action of air containing 65% humidity for a period of 6 days.

e. The paper was subjected to the action of drying heat of 80° C. for a period of 5 hours, and then it was exposed to air containing 65% humidity for a period of 13 days.

Note 1. After being exposed to air containing 65% moisture, the moisture content of the paper did not any longer exhibit any noteworthy changes, but only slight variations in both directions.

Note 2. The calculation of the tearing length is based throughout on the weight of the paper in the original condition in air containing 65% humidity.

CONCLUSIONS DERIVED FROM RESULTS

1. After the paper had been subjected to a drying heat of 80° C. for a period of 5 hours, it contained only 15%, in approximate figures, of the moisture that was in it in its original condition. After it had been allowed to remain in contact with air, which had a humidity of 65%, for a period of 24 hours, it regained almost all of the moisture that it possessed in its original condition.

2. The tearing length of the paper, after it had been subjected to a drying treatment lasting 5 hours, is, as was expected, greater than that determined for the original condition of the paper. On the other hand, under the same conditions the percentage of stretch produced in the paper was less after it had been subjected to the drying action than it was in the original state of the paper. This was similarly expected. When the paper is exposed to air containing 65% humidity, both values tend to approach those which are determined in the paper before it was dried.

3. The resistance of the paper to folding is reduced to a really remarkable degree by subjecting it to the drying heat of 80° C. On the average the tearing resistance of the paper after being dried was only 1% of what it was in the original state of the paper. When the paper was exposed to air containing 65% humidity, so that it could regain the moisture content that it possessed in its original state, it was found that the tearing resistance was not only brought back to its original value but was even greater than the original value in all kinds of paper. Then the value was reduced again after the paper had been further exposed to air containing 65% humidity until after a period of 13 days' exposure it was only 65% approximately of the same.

FURTHER EXPERIMENTATION NECESSARY

The number of tests which have been reported above are naturally too few to make it possible to derive authentic conclusions from them. In the first place, it is necessary to institute an investigation to determine whether or not the phenomena that were noticed and described above are accidental in nature or whether they conform to any definite law.

But the following deduction may be made from the aforementioned results, namely, that when paper is subjected to a heat of 80° C., it becomes very brittle, and, as long as it does not absorb sufficient moisture from the atmosphere to bring it back to its original state, it is very strongly sensitive to strong mechanical influences. In other words, it is essential that paper bags filled with hot cement be handled as gently as possible.

Tentative Standards for Cement Bags

Members of Committee D-13 of the American Society for Testing Materials conferred in Philadelphia, October 26, on the adoption of standard specifications for cement bags, and worked out tentative standards. The specifications agreed upon by committee members will probably be submitted to the society's annual convention to be held at Atlantic City next June, for adoption or for such changes as may be considered advisable.

Portland Cement Association Meets

A number of interesting features marked the twenty-first annual meeting of the Portland Cement Association held at the Biltmore Hotel, New York, November 19 to 21 inclusive. As usual, the first day's session was devoted to meetings of standing committees covering such subjects as accident prevention and insurance, advertising and publicity, conservation, technical problems, etc., resulting in the preparation of annual reports which were presented at the business session on Wednesday, November 21.

On Tuesday, also following several years' custom, the general session was devoted to a discussion of problems concerning mill practice or things related thereto. At this session papers were presented by Paul C. Van Zandt, chief engineer, Asano Portland Cement Co., 1918–23, on "The Manufacture of Portland Cement in Japan;" and by T. H. Cosford, assistant to general manager, Marquette Cement Manufacturing Co., on "Modern Cement Storages and Improvements in Methods of Loading and Packing, and Bag Handling."

The annual election of officers was held on Wednesday, November 21, with the following results: F. W. Kelley, Albany, N. Y., was elected president; Blaine S. Smith, Chicago, first vice president; L. R. Burch, New York, second vice president; all of these constituting reelected officers. John W. Boardman, Detroit, was elected treasurer.

As most of our readers know, the Portland Cement Association has been carrying on for the past two years or more an educational advertising campaign, particularly directed toward acquainting the public with a better understanding of some of the problems of cement manufacture. As is too often true in connection with sizable industries, the common public loses sight of its inter-relation with, and interdependence upon, any and all industry.

It was the consensus of opinion, expressed at the meeting, that this campaign has produced most gratifying results and has justified a continuance.

Unfortunately, early press notices contained the incorrect information that the proposed advertising expenditure for 1924 involved an outlay of $5,000,000. This is so wide of the mark as to be almost ridiculous to anyone at all familiar with even what are commonly called huge advertising appropriations. The fact of the matter is that the Portland Cement Association contemplates no such expenditure, but rather gave approval to essentially the same program for 1924 as has been carried on during the present year.

On October 5, the Portland Cement Association delegated H. M. Hadley, a well-known structural engineer of Seattle, Wash., and for many years prominent in connection with construction work on the Pacific coast to visit Japan, making a study and report on the effect of the earthquake on the many modern buildings erected in Japan within recent years. Mr. Hadley has not had time to make any more than a brief cabled preliminary report, which, however, seems to indicate that modern reinforced concrete structures in the earthquake zone gave a good account of themselves, and that concrete will be used more largely than ever in the great rebuilding plan in Japan which is already under way.

Another interesting item of information in this connection was contained in a letter just received by Charles F. Woodworth, vice president of the Weber Chimney Co., from U. Tanaka, Japanese representative of the company in Tokyo.

Especially interesting is the report concerning the wireless tower of the Imperial Japanese government, over which the only messages from Tokyo to the outside world were transmitted for some time after the catastrophe. The tower, built of reinforced concrete, is the highest masonry structure in the world. It stands 660 ft. above the ground level and 672 ft. above the bottom of the footings.

According to the letter to Mr. Woodworth, all of the concrete chimneys built by the company in Tokyo survived the earthquake. There were between 100 and 150 of these concrete chimneys built by the Weber company within the earthquake zone. All of these masonry structures were especially constructed to withstand earthquakes, according to Mr. Woodworth.

Attention of members was called to the latest report on the cement industry by the United States Geological Survey, which showed 1923 to be the banner year for cement production and shipment in the United States. The report, covering the first ten months of the year, showed that cement mills of the country shipped nearly 119,000,000 bbls. of cement during that period, with considerable reserve producing capacity, not used.

A party comprising leaders of the cement manufacturing industry of England, Norway and Denmark, who visited various cities throughout the United States for two weeks prior to the meeting of the Portland Cement Association, inspecting American concrete roads and studying American methods of using concrete in construction, with a view to using the information gained in developing the cement industry in their own countries, were guests at the banquet at the Biltmore on November 21.

During its trip, the party has visited the headquarters of the Portland Cement Association and the Structural Materials Research Laboratory in Chicago, the steel works at Gary, Ind., and the cement plants at Buffington, Ind. In Detroit, members of the party were shown concrete roads by Edward N. Hines, chairman of the Wayne County Road Commission, and were the personal guests of Henry Ford on a visit to his plant. From Allentown, Pa., visits were made to various works in the Lehigh district, and after visiting Independence Hall in Philadelphia, the members of the party were guests of Robert W. Lesley for luncheon at his home at Haverford.

The party included Percy Malcolm Stewart, A. C. Davis, F. Halford, H. H. D. Anderson, L. Lister-Kaye, E. A. Browne, S. G. Robinson, A. A. Holter, W. H. Lane, Brigadier-General A. E. Critchley and E. R. Moxey, all of England, and Paul Larsen of Denmark and H. L. Jackheln of Norway.

A cement plant which will embrace the very latest machinery and equipment for manufacturing portland cement is planned by the Peerless Portland Cement Co., of Union City, Mich., for a new site on West Jefferson Ave., Detroit, Mich. The Peerless company, one of the pioneers in the industry in Michigan, has purchased the site now occupied by the Lowrie & Robinson Lumber Co. on the Rouge river.

The capacity of the new plant will make it one of the most important cement plants in Michigan, and the buildings will be of permanent construction. Ample storage capacity for raw materials and finished cement will be provided. The site is well served by railroads, and plans have been made to provide for river shipments. The Rouge river at the site is to be straightened and the channel deepened, so as to allow the passage of lake freighters to and from docks that will be built at the plant.

Safety as Viewed by an Executive

By E. M. Young
First Vice President, Lehigh Portland Cement Co.

A paper read before the Cement Section, Twelfth Annual Safety Congress, Buffalo, N. Y., Oct. 3, 1923.

We are living in a wonderful country. Sometimes we forget to fully appreciate the advantages we enjoy. Our nation is all the more remarkable because of its rapid growth and development. The population of the U. S. in 1850 was less than 25 million, in 1880 it had only increased to 50 millions, and today the total reaches 110 millions. It is only 90 years ago that Chicago was incorporated as a town and four years later as a city. The estimated worth of this country in 1912 was 188 billions, and in 1923, 300 billions.

In the same manner the cement industry has had a remarkable and rapid growth. Only 33 years ago, which is well within my recollection, the production of portland cement in the United States was less than half a million barrels. In 1900 it had risen to 8,482,000 bbls. During the next ten years there were many plants built, and by 1910 production had risen to 76,549,000 bbls. Last year, 1922, showed the largest quantity produced, namely, 114,789,984 bbls., and 1923 promises to exceed 1922 by at least 18 million bbls., bringing the total for the year to probably 132 million bbls. Is there anywhere so remarkable a record of growth in industry within so short a time?

Cement companies in the earlier days conducted their business and operated their mills in a very simple manner. Few understood costs, and none realized the tremendous wear and tear of heavy machinery. The words, depreciation, obsolescence and depletion made only a hazy impression on the minds of those in charge. The result was many failures.

Companies which survived, slowly and gradually began to realize the necessity for better methods in all directions.

The placing of a federal tax on incomes of corporations had much to do with proper accounting, with consideration for depreciation and other items of loss. Competition brought about greater mill efficiency.

Workmen's compensation laws adopted by almost all states brought the attention of manufacturers to the serious dangers to which employes were exposed in cement mills. The slogan of "Safety First" began to be heard. Devices to minimize accidents were placed at all points of danger, with the result that today all properly equipped plants have safeguards wherever necessary.

Compare this with conditions ten to twenty years ago and the contrast is most striking. Many executives and managers for years failed to take the subject of "Safety" seriously, considering it more or less a silly fad, but gradually the importance of this wonderful movement has impressed itself on the minds of all competent and progressive manufacturers.

Safety work is above all humanitarian. What a harrowing sight it is to have a husband, father or son brought home on a stretcher maimed, dying or dead. Anything to lessen distress should appeal to the hearts of all men. Safety work pays financially.

If a company carries its own insurance, then, naturally, the lower the number of accidents the lower the cost. For the same reason a company which covers with insurance receives a low or high rate according to its record.

Safety work improves efficiency. Nothing has ever been introduced into cement plants which has touched the hearts and spirits of employes as has the interest of the management in their physical welfare. The work of the safety committee, the prizes for good records, the rivalry between plants for the least number of lost days bring about an esprit de corps which could not otherwise be developed.

The Lehigh Portland Cement Company was among the first to recognize the importance of this great movement. All its plants have long since been organized along safety lines; committees are regularly selected, and a reasonable sum is turned over yearly by the company to each committee. This money is used in many ways—a portion perhaps for a dinner to those who have been active in safety work. A careful record is kept of all lost days, and the rivalry between plants is simply remarkable.

Because of the constant effort of the safety committees to prevent accidents, it has become a sort of monitor which not only wields an influence over the men but does not hesitate to call to account a careless foreman or indifferent superintendent. The safety committee interests itself in keeping the mill clean, and sees to it that all unnecessary obstacles are removed.

The Lehigh company three years ago decided to carry its own compensation insurance in all states other than Pennsylvania. Each year there is credited to a reserve account an amount equal to the premiums which would have been paid to insurance companies.

By reason of the splendid work of the safety committee and the enthusiasm of the men, this reserve has grown to a very tidy sum, and in the course of a few years, with the same experience, the amount credited each year can be materially reduced.

The Lehigh company is very proud of its 1922 record as compiled by the Portland Cement Association. Out of 94 plants reporting, all of Lehigh's mills were among the first 30, and Lehigh was given a rating of 1st, 2nd, 3rd, 5th, 7th and 12th for its six best plants.

A Safety Campaign is held one month of each year, and June was the month selected. Any mill going through this month without a lost time accident is awarded a prize. Safety Campaigns have been held for the past three years with the following result:

1921, the prize was a large mill pennant, won by 5 mills.

1922, the prize was a beautiful American flag, won by 10 mills.

1923, the prize was a large silver cup, won by 11 mills.

At the end of each year there is a trophy awarded to the mill making the best record for the year. The trophy offered for the last two years by the company is a beautiful bronze tablet, 4½ by 15½ in. This trophy was won in 1922 by the West Coplay and Iola plants—there being a tie, the trophy was left at each mill for 6 months of the year. In 1922 the trophy was again won by West Coplay, and remains with this plant, as it was one of the rules governing the contest that the mill winning the trophy two years in succession might retain it.

The Safety Committee at each plant is also given a cash gift each year to do with as they see fit, each individual safety committee spending the money in whatever way they wish.

The Portland Cement Association has appropriated $1,500 to be expended for a trophy to be given to the employes of the plant having the least number of days lost for 100,000 man-hours of work during 1923. This provides a new and added incentive for greater effort for safety.

In my opinion as an executive, safety work has become as necessary and essential to the successful operation of a cement mill as a boiler house or a laboratory.

You men who give particular attention to this department should congratulate yourselves upon the importance of your work. You should take hope and inspiration from this convention and go back to your plants filled with the kind of enthusiasm which will be contagious among your men.

No Hope of Reduction in British Columbia

J. C. Tomlin, manager of the British Columbia Portland Cement Co., in a statement made to the Vancouver Builders' Exchange, has stated that on account of the condition of the company and because of the small market and, therefore, the small production, any revision of the cost of cement could not be hoped for. The company has never earned more than 3½% on their investment, it is claimed, and only one of the two plants which they own is now in operation. Heavy government taxes were stated to be one of the causes of the high price of their product. Mr. Tomlin replied to the criticism that the company sold cement to the government for less than was charged to individual contractors, by stating that what the company was really doing was selling the cement to the government at cost in the hope of encouraging greater use of concrete paving. This result had been accomplished to some extent, he pointed out, and many municipalities had taken up the idea of building concrete highways.—*Contract Record.*

Production of Clay in 1922

Statistics showing the production of clay by uses are necessarily incomplete, according to the United States Geological Survey, as many clay miners do not know the purposes to which their clay is put, but it is believed that the figures obtained are sufficiently complete to serve as a guide in the study of the uses of domestic clays. In considering these figures, it should be borne in mind that they represent chiefly the clay sold as clay by the original producers, and do not include the much greater quantities of clay that are burned into clay products by those who mine their own clay.

The total number of short tons of clay sold in the United States in 1922 for fire brick and block is given as 515,760. Fire clay mortar, including clay processed for laying fire brick, amounted to 314,586 tons. For bauxite and high alumina brick, 3,943 tons.

The tonnage listed as unspecified and which includes clay for brick, cement, refractory cements, roofing tile, sewer pipe, and many other uses, is 694,235.

German Potash Production Meets With Difficulties

Potash production in Germany, as well as the nitrogen fertilizer industry, is being conducted in the face of a multitude of difficulties, but recent reports to the Department of Commerce indicate that none of them is comparable, in magnitude, to those represented by labor troubles and the price of coal. The wage demands of the men are said to be beyond the ability of these industries to pay. While the workmen disclaim any intention of demanding more than the industries can afford to pay them, there are so many uncertain elements in cost accounting and estimates of living expenses that accurate figures cannot be compiled.

The most important recent development in the German fertilizer situation is the amalgamation of the agricultural bank and the powerful fertilizer concern of Kali Werke Ummendork-Eisleben.—*Chemical and Metallurgical Engineering.*

Coals for Cement Burning

Coal for cement burning is not limited as to size, because it is reduced to a powder before being used. Slack coal or screenings is generally used, on account of its low price and the readiness with which it can be reduced to a powdered state. The essential requirements are that the fuel be:

(1) Sufficiently high in volatile combustible matter to insure quick ignition.

(2) Sufficiently high in heating power.

While the maximum sulfur content of cement is definitely fixed, the sulfur in the coal has not been closely limited, as it dose not enter into combination with the cement as long as proper kiln temperatures are maintained. As the impurities of some coals are approximately of the same composition as the cement, no strict limits have been placed on the amount of ash in such coals, but high ash percentages reduce the heating power, and, for this reason only, a low ash content is desired.

Gas coals generally give best results in cement burning, as they are high in volatile matter, which has a high heat value with long flames of quick ignition and maximum temperature at a short distance from the kiln.

If coal which ignites slowly is used, ignition takes place too far inside the kiln, giving the zone of maximum temperatures at such a distance from the firing end, that difficulties are encountered in securing proper clinkering of the cement, besides increasing loss of heat due to the waste gases leaving the kiln at a high temperature. While gas coals are considered the best for cement burning, other high volatile bituminous coals are used—*Bertha Consumers Coal Bulletin*

White Cement Duty Free

Merchandise imported by Andre Weill & Co. and assessed with a duty of 10% as white non-staining portland cement, was claimed by the importer to be free of duty as portland cement. The Board of General Appraisers overruled the protest of the importer but the United States Court of Customs Appeals in a decision rendered November 17, by Associate Judge Smith reversed the decision of the board.

Cement Bags

Progress in the development of tests and specifications for Osnaburg cement bags was reported by Sub-Committee X of the American Society for Testing Materials. This is a problem that has been taken up by Committee D-13 at the request of the Portland Cement Association, for which purpose a number of representative producers and users of cement bags have been added to the committee. The main committee received the report and referred various suggestions to the sub-committee for its consideration.

Practical Blasting Cap Container

Built like the cartridge chamber of a six-shooter, the new du Pont blasting cap container, illustrated here, is the most recent blasting accessory offered for sale by the du Pont company. It meets a real need of blasters who, for lack of a service container, have heretofore carried detonators loosely in their pockets or in the tin boxes in which they are sold. This practice has frequently resulted in serious and sometimes fatal injuries. By the use of this new device the likelihood of such accidents will be greatly minimized.

The body of the container is made of vulcanized rubber. Drilled at regular intervals into its thick side walls are ten holes, each large enough to accommodate a blasting cap. The polished brass top cannot be removed, but can be rotated around the rivet pin which firmly secures it, so that the vent exposes the ten compartments one at a time. You fill the container with blasting caps just as you would load a six-shooter with cartridges. After filling, the top can be turned so that the vent is effectually closed over a blind hole. Incidentally, this top is designed to prevent accidental turning, which is only one of its several safety features.

The Du Pont Blasting Cap Container

The legend—"Blasting Caps—Dangerous—Handle Carefully"—is embossed in white letters on the back of the container along with the following safety rules:

Do not remove caps with wire or nail.
Don't tap or otherwise investigate them.
Don't carry caps loose in pocket.
Don't store in residence.
Don't smoke near caps.
Don't shoot into caps.
Attach caps to fuse with cap crimper, not with knife or teeth.
Keep in a dry place.
Keep open lights away.

Containers are made for No. 6 caps and for No. 8 caps.—*The Du Pont Magazine.*

Utilization of Waste Limestone at Lime Plants

Thousands of tons of pure limestone in sizes under 4-inch are either entirely wasted at many lime plants or are sold for uses that bring a very small return to the producer. The Department of the Interior, through the Bureau of Mines, has undertaken a study of possible methods of utilizing such material, the study relating particularly to methods of burning it into lime. Preliminary work has been done at the non-metallic minerals station of the Bureau of Mines, New Brunswick, N. J., on present uses of waste limestone and on the success with which the rotary kiln is used with fine materials. Arrangements were made for field investigations at several Pennsylvania plants.

Trade Publications

Westinghouse Underfeed Stoker, New Model Design, is the name of a pamphlet issued by the Westinghouse Electric & Manufacturing Co., Philadelphia. Size 8½ in. x 11 in.; fully illustrated and describing the Westinghouse new model multiple retort underfeed stoker, which is built in all types and sizes to meet specifications for industrial and central station requirements. The types include double and single dump grates, also double and single roll ash discharge devices. The stoker can be built to fit the requirements of the particular setting.

Electric Motors, How to Choose and Use Them. This is the title of a 32-page booklet, 33½ x 6¼ in., issued by The Reliance Engineering Co., Cleveland, Ohio. The booklet is illustrated, and contains information indicated by the title. The information regarding the use of motors includes installing new equipment and subsequent care. Interesting data are included about the application of various kinds of motors and the sizes of motors required for various kinds and sizes of machinery.

Pulverburner for Powdered Coal Firing, Bulletin No. 20, just issued by the K-B Pulverizer Corporation, New York, describes and illustrates the Pulverburner, a mechanical unit of an efficient and generally applicable system of burning powdered fuel.

The object of this 11-page 8½-in. x 11-in. bulletin is to give the readers the benefit of the experience of users of powdered fuel equipment, the statements therein being conservative presentations of facts as experience has shown them. The booklet further describes the operating characteristics of the Pulverburner as to dust, fire and explosion hazard, and mentions different operations where powdered coal can be burned to advantage.

A new hand-book on gears and speed transformers is being issued by the William Ganschow Co., Chicago, Ill., and will be combined with the forthcoming *Ganschow General Catalog No. 100.*

The purpose of the hand-book is to afford the user of gears and speed transformers easy access to formulae and data regarding their design and use.

It contains much data that is usually found only in general engineering hand-books.

Aside from the formulae and data pertinent to gears and speed transformers, it also contains much information that is useful in the designing of machinery to which they may be applied.

The *Ganschow Hand-Book Catalog No. 100* is to be distributed gratis to all who use such materials as are made by the William Ganschow Company.

Utilization of Anhydrite in Cement

Anhydrite, which occurs in considerable quantities at some gypsum mines, is now practically a waste material. Steps have been taken by the Department of the Interior, through the Bureau of Mines, to determine the amount of anhydrate available at various plants, and the possibility of finding useful applications for it in industry, for example, as a substitute for gypsum as a retarder in portland cement. This work is being done at the non-metallic minerals station of the Bureau of Mines at New Brunswick, N. J.

Three major building projects are under way for The Monarch Cement Co., Humboldt, Kan.

Six reinforced concrete cement storage tanks, each 30 ft. x 75 ft. and practically in conformity to the present six tanks now in use, are at present under construction. The erection of these tanks is under the supervision of The Arkansas Bridge Co., Kansas City Mo.

Another power unit, symmetrical to the present 1500 k. w. unit is being installed this winter. This unit is also being furnished by the General Electric Co. The Power Plant Equipment Co. of Kansas City, Mo., are consulting engineers for the installation. The completion of this unit furnishes the company with 3000 k. w. a. c. current.

Arrangements have been made with the M. K. T. Railroad for switching connections between their line and the plant. This requires approximately a mile and a half of trackage and a Neosho river bridge span. Work on the grade and bridge span will begin in the near future.

Men and Mills

Notes from the Field

Stanley Downs, formerly of the Canadian Portland Cement Co., is now superintendent of the Hercules Cement Co., at Stockertown. Mr. Downs and his family are stopping at the Nazareth Inn.

A shot of 10,200 lbs. of explosives was fired at the Balfour quarry of the Olympic Portland Cement Co. recently, which brought down thousands of tons of rock. The company will operate its Bellingham plant until just before Christmas, and will resume operations as soon as annual repairs can be made, and expects a good demand for cement next year.

John Bingham, Alpena city councilman and master mechanic of the Michigan Alkali Co., is laid up temporarily at his home in Alpena as the result of stepping off a slight elevation at the plant a week ago and seriously injuring his ankle.

The new flagship, John W. Boardman, of the Huron Company's cement fleet, left Alpena November 9, with her first cargo, bound for Detroit. The civic welcome that had been planned at Alpena was deferred until next spring, since it was desired not to delay the new steamer any longer than was absolutely necessary.

Nazareth, Pa., recently suffered from a water famine, which made it necessary for the Dexter Portland Cement plant to suspend operations. The water supply was also cut off from the Nazareth and Phoenix cement companies.

Governor Silzer of New Jersey sets forth, as a result of his investigations, that the average earnings of the eleven largest manufacturers of cement in the East were 7.3% for the year 1922, and that the industrial results of the year 1922 on the part of these mills have been the production of the largest volume of cement in their history.

Charles A. Porter of Allentown, vice president and general manager of the Lawrence Portland Cement Co., sailed for Europe on business a short time ago on the Helig Olav.

The steamer Conneaut, on its way from Cleveland to Alpena for a cargo of stone, rescued nineteen sailors from Middle Sister Island, Lake Erie, to which they had battled their way in lifeboats when the steamer Wesee, on which they were sailing, burned.

The Wolverine Portland Cement plant, at Quincy, Mich., has had a very busy and profitable season the past year. The demand for the cement from this mill has been strong all year, and a full force of men has been kept at work. It is probable that there will be no let up in the production of the local plant until the winter freeze-up occurs, when the mill usually undergoes repairs. The Coldwater plant of the same company likewise has had a busy season.

The new hydrating plant of the Ohio Hydrate and Supply Co. has been equipped with one Clyde hydrator with a capacity of about 7 tons per hour and a Schaffer hydrator with a capacity of about 14 tons per hour. Also with an additional four-tube Bates bagger, one Raymond beater mill, capacity about 7 tons per hour, and one Raymond roll mill with a like capacity.

The new lump handling plant consists of a cooling bin with a capacity of about 500 tons and three pulverized burned lime tanks, each with a capacity of about 150 tons. Since this equipment was installed, the lime is drawn from the kiln coolers direct into steel cars. These cars are weighed so as to determine the tonnage from each of the 24 double kilns. In this way the company has a check on the workmen and efficiency of kilns and kiln equipment.

The ground lime plant consists of a Pennsylvania hammer mill, steel pan conveyor, elevators, screens, automatic loader and a steel conical bin with a capacity of about 300 tons. The capacity of this plant is about 10 tons per hour.

This company also recently installed another 150 h. p. boiler, so as to take care of the steam requirements of the new kilns, and now contemplates the erection of a new stone crusher to take care of the increased output from the quarry.

The company is not only increasing the capacity and efficiency of the equipment but is also giving closer supervision over the inspection and uniformity of product. Russel L. Hardy was recently appointed as chemist, after developing a quick-setting lime plaster at Indiana University, Bloomington, Ind. The patents for this product were turned over to the National Lime Association for use by all members.

C. H. Rowan, of Charlotte, N. C., who will have charge of sales throughout the southern states, has recently been employed.

C. P. Tolman, 111 Broadway, New York city, for the past 16 years chief engineer and chairman of the Manufacturing Committee of the National Lead Co., has resigned and gone into general consulting practice. He will specialize in dust and fume control, handling materials and products and in manufacturing methods and processes particularly.

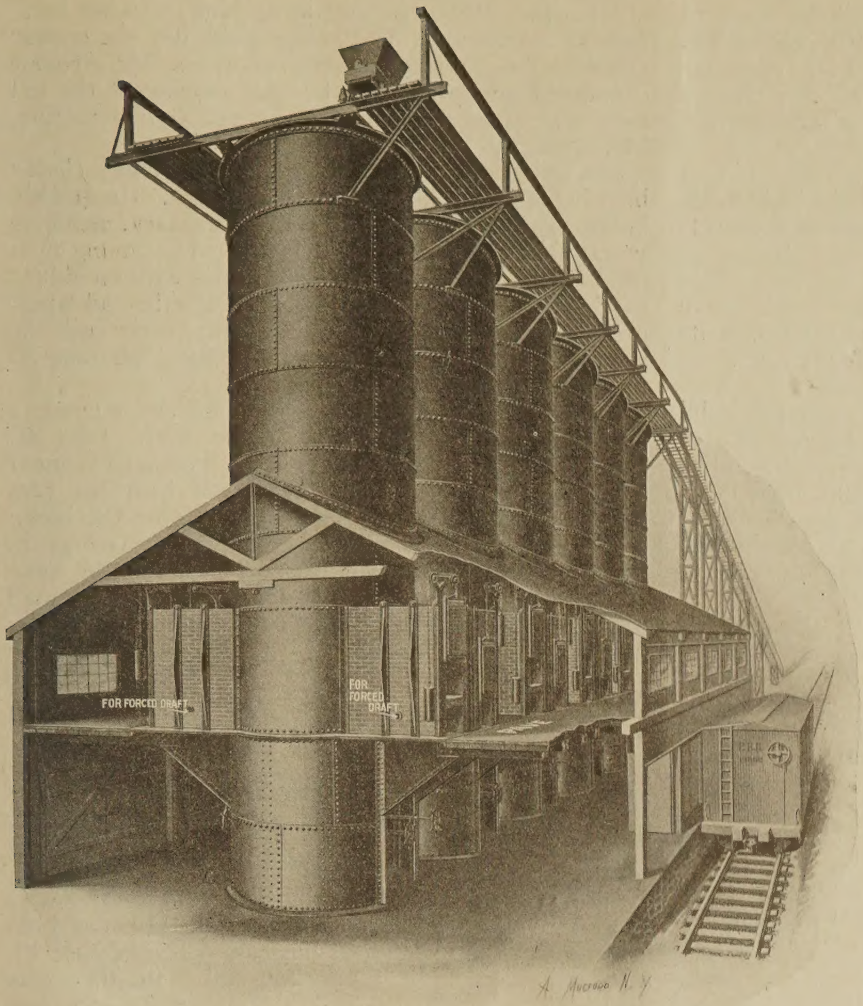
The Olympic Portland Cement Co. has recently completed a concrete water tower with a capacity for 62,000 bbls. The company is operating three shifts, and will be busy until Christmas, this year being reported as one of the busiest the company has ever experienced.

Japanese have been inquiring actively for cement in the American market, and it is reported that one large New York commission house received an inquiry for 10,000 tons.

Cement mills in western Missouri, Nebraska, Colorado, Kansas and Oklahoma produced 9,051,000 bbls. of cement the first nine months of 1923, as compared with 7,231,000 bbls. for the corresponding period of 1922.

J. E. Zahn, of the United States Portland Cement Co., Denver, Colo., has been named vice president in charge of business administration for the newly organized Denver unit of the National Safety Council.

The Denver Y. M. C. A. has organized a class in "Purchasing," many prominent business men of Denver having signified their willingness to lecture before the class. Among the names received is George Minshull of the Colorado Portland Cement Co.



Some Facts About Lime Burning

Do you know that:

A good burnt lime is only obtained where the temperature can be regulated at will and maintained constant after regulation?

Or that the product should always be in view in the firing zone to insure satisfactory burning.

Or that unless means are provided to readily break down an "arch," a poor product and inefficient operation will result?

Or that a cooling cone or drawing shears enables the operator to draw his lime directly into barrels or box cars for immediate shipment?

If you are an experienced operator, all these points will appeal to you.

If, on the other hand, you are contemplating the installation of lime-burning equipment for the first time, you should certainly write for facts about the Keystone Lime Kiln, for it is this kiln which embodies all these features.

...Write for Catalog...

Steacy-Schmidt Manufacturing Company
York, Penna.

Keystone Lime Kilns

The Pennsylvania Cement Co., which holds a record of not having shut down for 25 years, is still progressing. The Turner Construction Co., of New York, has large contracts with the cement company, which include a modern waste heat boiler system and a large storage water dam.

The fifteen or more cement plants, of which Bath, Pa., is the railroad hub, report good business prospects for work all winter.

Contracts for six new cement storage tanks have been let by the Lawrence Portland Cement Co. at its Northampton plant. Work is to begin at once.

The Southern Pacific Ry. Co., in an order issued by the public service commission, received permission to establish a rate on cement in carload lots of 60,000 lbs. minimum from Gold Hill to Portland and East Portland for use in combination with rates on other lines to points beyond Portland, and to establish through rates to Portland and East Portland equivalent to these combination rates.

Good progress is being made at the cement plant of the Pittsburgh Plate Glass Co., Columbia Chemical Division, Limestone Products department at Zanesville, Ohio. The coolers and compeb mills are all set, and the kilns placed on their respective foundations.

The net surplus of the International Cement Corp. for the quarter ending September 30, last, is reported in the New York financial papers at $755,623, equal to $2.00 a share on the common stock outstanding, after deducting depreciation, interest, etc., and allowing for preferred dividends.

The gross sales for the quarter ending September 30 were reported at $4,001,542.

Work on the proposed cement mill at Dubuque, Ia. for the Globe Portland Cement Co., with an estimated cost of $2,000,000, has been postponed.

The old quarry of the Lawrence Portland Cement Co. in Northampton is being filled with dirt and stones, part of the material coming from excavated streets.

Charles Porter, president of the Lawrence Portland Cement Co., was recently elected president of the Dairy Products Co., of Allentown, Pa.

One hundred members of the Lehigh Valley Section of the American Chemical Society attended the meeting in the auditorium of Pardee Hall, Easton, Pa., recently, when Dr. James Kendall, professor of chemistry of Columbia University, gave an address.

Sharpe M. Smith, sixty-three years of age, an employe of the Edison Cement Co., at New Village, Pa., died recently at his home.

His Red Sweater Won Him Promotion

Phil Armour, founder of Armour and Company, noticed a young clerk of impressive stature wearing a red sweater in the office. Next day Mr. Armour again saw the red sweater. The third day the young giant again had on the gaudy sweater. Mr. Armour asked his secretary why the young man came to work in such an inappropriate garment. The secreatry did not know. "Then, go and bring him in to see me," Armour instructed. The young giant did not appear at all nervous on receiving the summons. Mr. Armour demanded an explanation for the wearing of the red sweater. "I wore it so as to attract your attention, Mr. Armour," came the cheerful reply.

Mr. Armour secretly admired the young clerk's bold ingenuity. He began to watch him. He quickly became convinced that here was no ordinary, mediocre young fellow. Promotion followed. The young man discharged his increased responsibilities with an ability that delighted the veteran packer. Further advancement followed, and at a remarkably early age the wearer of the red sweater was on the high road to unusual achievement and success.

Who was the young man of this incident, related to me by a business leader the other day? John R. Morron, now president of the Atlas Portland Cement Company and influential director of banking, railroad and industrial corporations. He is on the board of the First National Bank of New York, George F. Baker's institution, and is perhaps closer to the dean of America's bankers than is any other business man in the country. Mr. Morron is only 55.—*Forbes Magazine.*

Cement Prices Reduced

Reductions in the mill prices of portland cement were announced by several of the larger cement companies in November.

The Huron and Wyandotte Portland Cement companies of Detroit voluntarily reduced the wholesale delivered price in the city of Detroit 11¢ per bbl., effective at the opening of business on November 10. This reduction, while in part seasonal at the time, was furthermore voluntarily made to stimulate renewed interest in winter construction, and to promote house building in Detroit and throughout Michigan.

The Universal Portland Cement Co. issued a tabulation of current net prices of cement in sacks, as of November 19, 1923, giving the net price to the contractor or consumer f. o. b. Detroit, as 59¼¢. per sack or $2.37 per bbl. Universal prices at other important points are as follows: Chicago, 52½¢ per sack; Cleveland, 60¼¢; Duluth, 54¾¢; Milwaukee, 56¼¢; Pittsburg, 54¾¢.

Reductions in prices at mills in the Lehigh Valley and Hudson Valley districts are reported as ranging from 5¢ to 15¢ per bbl., being in some instances the first decline in price since August 31, 1922. Current mill prices to consumers were reported as $1.95 per bbl. in the Lehigh district, and $2.05 per bbl. in the Hudson district.

The Atlas Portland Cement Co. has reduced the price of cement 25¢ a barrel, in the Alabama district the reduction occurring November 10. D. R. Long, sales manager of the company, announced that the reduction in price is not made because of market conditions, or any influence of law of supply and demand, but simply because the company has found that it is possible to reduce the cost of its production. The market conditions are most excellent.

The southern plant of the Atlas company is located at Leeds, Ala. This plant is being operated night and day to fill orders, caused by the heavy building conditions of the entire south, and which show no let up for the winter season. This company will ship about 250,000 bbls. of cement before January 1, 1924, and the reduction on the price of this amount will be $62,500, in addition to reductions under previous contracts.

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